INDUSTRY AND EDUCATION

It is my privilege this morning to talk about education and industry. What competence I may have to speak on this subject centers in the relationship of industry to the field of higher education - the college and the university, of course. It may be said that colleges and industry today are in the full bloom of a courtship. The consequences of that courtship are of great and long range interest to the welfare of this nation and of the entire world. Each party to the courtship has found very interesting prospects of a real romance developing which may, and if properly pursued by the parties of interest, will provide a healthy union from which should emerge a fine lot of healthy children.

The most publicized motives for a romance between colleges and industry are the former's desire for more dollars in the form of corporate gifts and industry's need for better trained intelligence at all levels of research and development, production, marketing, finance and the generalized field of management. The colleges - and I speak principally although not exclusively of the independently financed colleges - seek funds

so that they may operate in the manner to which they would like to become accustomed - so that they may cease to be second rate economic cousins to the industries and the professions they serve - so that they may attract and retain against the emoluments of industry, able and inspiring teachers - men to whom you would be glad to entrust the task of developing the intellectual potential of your own sons and daughters. Industry is today in the middle of a shortage of well educated men of special competence in almost all fields of endeavor. This shortage, almost inevitably, must become worse before it can be overcome for the applications of science and technology to our industrial operations are resulting in ever more complex patterns of operation. These, in turn, are requiring better trained men in all levels of production and management.

Most of you - probably all of you - have heard the monetary requests of the colleges and have experienced to a greater or lesser extent the shortage in your operations, of well qualified manpower. Most of you will have responded to the urgent pleas of the colleges by making gifts, some small enough to be called piddling; others where you have really extended yourselves to help. I assure you that all of your gifts, large or small, are gratefully received and that the money is put to good

use -- usually with greater effectiveness and efficiency than you may realize.

I could go on and make an impassioned plea for more and larger gifts - and my Cleveland friends would tell you that I would then be right in character - but I want to direct your attention this morning to the more fundamental aspects of the partnership of industry and the colleges in attempting to solve their mutual problems.

Let me deal first with what seems to me to be fundamentally necessary as a matter of mutual agreement without which this relationship will find itself on the rocks. The bridge of understanding between industry and education is a two way bridge. Each partner must recognize the rights and responsibilities of the other - each must consider the maintenance of the integrity of the other as a matter of principle in the development of the relationship. This suggests that as a matter of honesty in future dealings we must each know more about the other.

I hold that the very evident desire of both parties to collaborate should blind neither the college nor industry to the distinctive nature of their individual aims. Industry as such can legitimately claim only one ultimate aim - the realization of material profit for the owners of industry. In saying this I recognize, of course, that the interests of the worker, of the

public and of society generally must claim a substantial portion of the time and energy of our industrial managers but - without profits there will be no industry in the competitive sense that we understand and believe to be necessary to the spreading of benefits to all segments of our society. Higher education in broad terms, has as its basic aims the discovery, the preservation and dissemination of knowledge in the interests of developing the individual as a person who will contribute effectively to the general welfare of our society and the progress of humanity everywhere.

To expect industry to provide funds to education in such amounts as to impair the stability of the company contributing would be stupid. The determination of the level of giving is a matter for the company management ad while we in education may and some of us most certainly will try to raise the level of these gifts, we recognize management's prepogatives in such matters. Looking now at the colleges - if education is to achieve its basic aims, it must be apparent to you in industry that while much of the work of the institution of higher learning will have no immediate or direct relationship to industry we must preserve the independence of these institutions as they seek to realize more fully their broad purposes in our society. Yet there is room for interchange of ideas and enlargement of areas of understanding

for the benefit of all concerned.

To an extent, this is happening. It is significant to me that management recognized, before many of our educators did, the fact that narrow training in specific skills does not produce the most intelligent, resourceful and effective worker. And the college's response to the suggestions of industry have been effective and timely. Similarly, industry is beginning to realize that the research it defines one day as impractical and without specific end-product value - and this is the kind of research that is or ought to be carried on on our campuses - may turn out the next day to be the basis for entirely new fields of industrial activity. The most dramatic example of this today is the field of atomic energy. Isn't it clear that industry, for these and many other reasons, has a real stake in maintaining the independence from industrial control, as much as the independence from political control, of our colleges and universities?

If we can agree, at least in principle, on the validity of this position, how can these two obviously necessary institutions collaborate further for the benefit of each? Much has been said and written in answer to this question but I'll confine myself to three particular areas of interest to schools such as mine which should be of interest to industries such as yours. In each area I will try to point out our joint and individual responsibilities.

First, there is the matter of the educational program itself. For many years engineering educators have been struggling to compress within a four year span a program in basic science and applied science or engineering. During the past ten or fifteen years there has been a growing recognition that this is a losing game. Industry demanded that engineering education be modified to provide for a broader educational experience a slide rule engineer, even a good one, was not enough. So we revamped and intensified our programs in the humanities and social sciences and allocated additional curricular time to these fields. At the same time it became apparent that the interval of time between the discovery of new knowledge in the various fields of basic science and the application of that knowledge in the industrial process had shortened sometimes almost to the vanishing point. For us to teach the art of engineering, except in its broadest principles, is to admit today that we are teaching methods and applications that already are out of date in industry. Coincidentally, the individual fields of engineering have become increasingly interdependent. All of this has finally forced us to a concentration in the basic physical and engineering sciences with a consequent decrease in the amount of time allocated to specific and applied engineering courses. The man thus trained will be less ready to

earn his salt or pay his way the day he enters industry but he will be much better prepared to progress and grow in industry than was his predecessor. Industry must understand this situation, that the four year graduate is an interme, well trained for further development in industry or in the graduate school or both. Specialisation is more and more to be delayed beyond the undergraduate degree. In the broadest sense this is a sign of our technological age and we both have a responsibility for the solution of this problem which was stated in an interesting way recently by Norman Cousins, editor of The Saturday Review. I quote from his editorial entitled Beyond the Classroom.

"The conclusion is inescapable that it is no longer accurate - nor has it been for some time - to apply the term 'higher education' to American colleges. What seemed adequate only a short time ago for the purposes of top-level education now fulfills an intermediate function at best. The definition of what constitutes a truly educated person has expanded so prodigiously within a single generation that the average college graduate of 1955 may be no better equipped than the average high-school or even elementary-school graduate at the turn of the century. This fast-widening gap between formal education and the requirements of a world community is perhaps the main

problem and challenge in education of our time."

I repeat again, this problem is one requiring for its solution the utmost in cooperation and understanding between industry and education.

Second, there is great need for support of basic research on our campuses. Research has become so important a part of our dynamic industrial scene that more than 5 billion dollars was spent in this field last year. But most of this money went for applied research and development, the creation of better gadgets and better methods, the satisfaction of demands for cheaper and more efficient production. The discovering of new knowledge by people who were simply satisfying their curiosity about nature and its laws was accorded a very small portion of those billions. Teaching and basic research are inseparable. Through his researches and those of his colleagues the teacher keeps himself in the learning attitude and at the sharp cutting edge of his field. At the same time he trains apprentices, graduate students, who thus enlarge their own capacity for learning and for applying that learning to the increasingly complex problems of industry.

Most of the support for the basic research of our professors comes from the government. Much more support is

needed. As a matter of fact, the good professor often values such support more highly than an increase in his own paycheck. Generous action on the part of industry will most certainly result in tangible dividends in the discovery of new knowledge and the training of larger numbers of qualified men beyond the four year level. From this group will come many, if not most, of the uncommon men so badly needed these days.

Finally, we must re-examine the sometimes unimaginative approaches we pursue in the teaching process. We all know that we are just beginning to experience the shortage of teachers that will really plague us within five years at the college level. The employment of teaching assistants, student assistants, closed circuit television and numerous other schemes have had some haphazard attention from our institutions during the past few years. But a really determined attack on the prejudices of past practice has not yet been made. In the case of my own institution, there will take place this very evening the first of many meetings of our faculty members who are as aware of these problems as I am and who are determined to help find some answers. We also are active this year in a study of the use

of television in several experimental approaches to the problem of making the teacher more effective in handling both numbers of students and different types of subject matter.

We are confident that we will find some useful answers but we know full well that better salaries and more adequate facilities and research support are necessary to the ultimate solution of this problem. Time is short and action is needed. Here, again, the colleges are acting in the interests of industry and of society and the reciprocal responsibility is placed upon both industry and the individual to support more adequately our efforts.

Gentlemen, you have been kind to list to this somewhat rambling discourse. As I close I want to say that if every college could be supported as well as Case has been by the industries of Cleveland and of this general vicinity many of these problems would be less critical today. But ours is a continuing and growing need - yours has the same characteristics. Just as we attempt to recognize and discharge our increasing obligations to you, you must build into your businesses the continuing and increasing support of higher education. As Wilson Compton has said, "What happens to higher education in America ultimately will happen to America."

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